

WHAT IS CLAIMED IS:

- 1                    1.     A system comprising memory including a computer code product  
2     for training computing devices for classification or identification purposes for one or  
3     more substances capable of producing olfactory information, the memory comprising:  
4                    a code directed to providing at least a first data from a first substance and a  
5     second data from a second substance to a computing device, the data being comprised of  
6     a plurality of characteristics to identify the substance;  
7                    a code directed to normalizing at least one of the characteristics for each of  
8     the first data and the second data;  
9                    a code directed to correcting at least one of the characteristics for each of  
10    the first data and the second data;  
11                   a code directed to processing one or more of the plurality of characteristics  
12    for each of the first data and the second data in the computing device using pattern  
13    recognition to form descriptors to identify the first substance or the second substance; and  
14                   a code directed to storing the set of descriptors into a memory device  
15    coupled to the computing device, the set of descriptions being for analysis purposes of  
16    one or a plurality of substances.
- 1                    2.     The system of claim 1 wherein the characteristics can be selected  
2     from olfactory information, temperature, color, and humidity.
- 1                    3.     The system of claim 1 wherein the pattern recognition is a Fisher  
2     Linear Discriminant Analysis.
- 1                    4.     The system of claim 1 wherein the first data and the second can be  
2     selected from a transient stream of data or from a static source of data.
- 1                    5.     The system of claim 1 wherein the steps are performed  
2     continuously in the computing device.
- 1                    6.     The system of claim 1 wherein the data are captured from an array  
2     of olfactory sensors.
- 1                    7.     The system of claim 6 wherein the olfactory sensors are comprised  
2     of a polymer component.

1           8.     The system of claim 1 wherein the first data and the second data  
2 are provided through a worldwide network of computers, the worldwide network of  
3 computers comprising the Internet.

1           9.     The system of claim 1 wherein the first data and the second data  
2 are captured from a first sensor and a second sensor, respectively, disposed in an array.

1           10.    The system of claim 1 wherein the first data and the second data  
2 are captured from a first sensor and a second sensor, respectively, disposed in an array  
3 and transported through the Internet..

1           11.    A system including memory and computer codes for preprocessing  
2 information for identification or classification purposes, the system comprising:

3               a code directed to acquiring a voltage reading from a sensor of a sensing  
4 device, the sensor being one of a plurality of sensors that are disposed in an array;

5               a code directed to determining if the voltage is outside a baseline voltage  
6 of a predetermined range; and

7               a code directed to rejecting the sensor of the sensing device for use in  
8 acquiring sensory information, if the voltage is outside the predetermined range.

1           12.    The system of claim 11 further comprising a code directed to  
2 repeating steps of acquiring and determining for any other sensors in the plurality of  
3 sensors in the array to detect a faulty sensor that is outside the predetermined range.

1           13.    The system of claim 11 wherein each of the sensors in the array  
2 acquires a respective voltage reading simultaneously.

1           14.    The system of claim 11 further comprising a code directed to  
2 exposing at least one of the sensors to a sample and acquiring a sample voltage from the  
3 sample.

1           15.    The system of claim 11 further comprising a code directed to  
2 exposing at least one of the sensors to a sample and acquiring a sample voltage from the  
3 sample, if the sample voltage is outside a predetermined sample voltage range, reject the  
4 one exposed sensor.

1 16. The system of claim 11 wherein the plurality of sensors comprise  
2 an olfactory sensor, the olfactory sensor being comprised of a polymer component.

1 17. A system for classifying or identifying one or more substances  
2 capable of producing olfactory information, the method comprising:

3 a process manager;

4 an input module coupled to the process manager for providing at least a  
5 first data from a first substance and a second data from a second substance to a computing  
6 device, the data being comprised of a plurality of characteristics to identify the substance;

7 a normalizing module coupled to the process manager for normalizing at  
8 least one of the characteristics for each of the first data and the second data;

9 a patterning recognition module coupled to the process manager for  
10 processing one or more of the plurality of characteristics for each of the first data and the  
11 second data in the computing device using pattern recognition to form descriptors to  
12 identify the first substance or the second substance; and

13 an output module coupled to the main process manager for storing the set  
14 of descriptors into a memory device coupled to the computing device, the set of  
15 descriptions being for analysis purposes of one or a plurality of substances.

1 18. The system of claim 17 wherein the characteristics can be selected  
2 from olfactory information, temperature, color, and humidity.

1 19. The system of claim 17 wherein the pattern recognition is a Fisher  
2 Linear Discriminant Analysis.

1 20. The system of claim 17 wherein the first data and the second can  
2 be selected from a transient stream of data or from a static source of data.

1 21. The system of claim 17 wherein the steps are performed  
2 continuously in the computing device.

1 22. The system of claim 17 wherein the data are captured from an array  
2 of olfactory sensors.

1 23. The system of claim 22 wherein the olfactory sensors are  
2 comprised of a polymer component.

1 24. The system of claim 17 wherein the system is provided in a  
2 computer.

1 25. The system of claim 17 wherein the pattern recognition module  
2 comprises a plurality of pattern recognition algorithms.

1 26. The system of claim 17 further comprising a data storage device  
2 coupled to the main process manager.

1 27. The system of claim 17 further comprising a network module  
2 coupled to the main process manager, the network module being coupled to a worldwide  
3 network of computers.

1 28. The system of claim 17 further comprising a network module  
2 coupled to the main process manager, the network module being coupled to a world wide  
3 network of computers, the input module being coupled to a sensor device comprising a  
4 plurality of sensors through the world wide network of computers.

1 29. A method for training computing devices for classification or  
2 identification purposes for one or more substances capable of producing olfactory  
3 information, the method comprising:

4 providing at least a first data from a first substance and a second data from  
5 a second substance to a computing device, the data being comprised of a plurality of  
6 characteristics to identify the substance;

7 normalizing at least one of the characteristics for each of the first data and  
8 the second data;

9 correcting at least one of the characteristics for each of the first data and  
10 the second data;

11 processing one or more of the plurality of characteristics for each of the  
12 first data and the second data in the computing device using pattern recognition to form  
13 descriptors to identify the first substance or the second substance; and

14 storing the set of descriptors into a memory device coupled to the  
15 computing device, the set of descriptions being for analysis purposes of one or a plurality  
16 of substances.

1 30. The method of claim 29 wherein the characteristics can be selected  
2 from olfactory information, temperature, color, and humidity.

1 31. The method of claim 29 wherein the pattern recognition is a Fisher  
2 Linear Discriminant Analysis.

1 32. The method of claim 29 wherein the first data and the second can  
2 be selected from a transient stream of data or from a static source of data.

1 33. The method of claim 29 wherein the steps are performed  
2 continuously in the computing device.

1 34. The method of claim 29 wherein the data are captured from an  
2 array of olfactory sensors.

1 35. The method of claim 34 wherein the olfactory sensors are  
2 comprised of a polymer component.

1 36. The method of claim 29 wherein the first data and the second data  
2 are provided through a worldwide network of computers, the worldwide network of  
3 computers comprising the Internet.

1 37. The method of claim 29 wherein the first data and the second data  
2 are captured from a first sensor and a second sensor, respectively, disposed in an array.

1 38. The method of claim 29 wherein the first data and the second data  
2 are captured from a first sensor and a second sensor, respectively, disposed in an array  
3 and transported through the Internet.

1 39. A method for teaching a system used for analyzing  
2 multidimensional information for one or more substances, the method comprising:  
3 providing a plurality of different substances, each of the different  
4 substances being defined by a plurality of characteristics to identify any one of the  
5 substances from the other substances, the plurality of characteristics being provided in  
6 electronic form;

7 providing a plurality of processing methods, each of the processing  
8 methods being capable of processing each of the plurality of characteristics to provide an  
9 electronic fingerprint for each of the substances;

10 processing each of the plurality of characteristics for each of the  
11 substances through a first processing method from the plurality of processing methods to  
12 determine a relationship between each of the substances through the plurality of  
13 characteristics of each of the substances from the first processing method; processing  
14 each of the plurality of characteristics for each of the substances through a second  
15 processing method to determine a relationship between each of the substances through the  
16 plurality of characteristics for each of the substances from the second processing method;  
17 and processing each of the plurality of characteristics for each of the substances through  
18 an nth processing method to determine a relationship between each of the substances  
19 through the plurality of characteristics from each of the substances from the nth  
20 processing method;

21 comparing the relationship from the first processing method to the  
22 relationship from the second processing method to the relationship from the nth  
23 processing method to find the processing method that yields the largest signal to noise  
24 ratio to identify each of the substances; and

25 selecting the processing method that yielded the largest signal to noise  
26 ratio, whereupon the relationships from the selected processing method provide an  
27 improved ability to distinguish between each of the substances using the selected  
28 processing method.

1 40. The method of claim 39 wherein the plurality of processing  
2 methods can comprise a method selected from PCA, HCA, KNN CV KNN Prd, SIMCA  
3 CV, SIMCA Prd, Canon Prd, and Fisher CV.

1 41. The method of claim 39 wherein the characteristics can be selected  
2 from olfactory information, temperature, color, and humidity.

1 42. A method for preprocessing information for identification or  
2 classification purposes, the method comprising:

3 acquiring a voltage reading from a sensor of a sensing device, the sensor  
4 being one of a plurality of sensors that are disposed in an array;

5 determining if the voltage is outside of a baseline voltages of a  
6 predetermined range; and  
7 if the voltage is outside of the predetermined range, rejecting the sensor of  
8 the sensing device for use in acquiring sensory information.

1 43. The method of claim 42 further comprising repeating steps of  
2 acquiring and determining for any other sensors in the plurality of sensors in the array to  
3 detect for a faulty sensor that is outside the predetermined range.

1 44. The method of claim 42 where each of the sensors in the array  
2 acquires a respective voltage reading simultaneously.

1 45. The method of claim 42 further comprising exposing at least one of  
2 the sensors to a sample and acquiring a sample voltage from the sample.

1 46. The method of claim 42 further comprising exposing at least one of  
2 the sensors to a sample and acquiring a sample voltage from the sample, if the sample  
3 voltage is outside of a predetermined sample voltage range, reject the one exposed sensor.

1 47. The method of claim 42 wherein the plurality of sensors comprise  
2 an olfactory sensor, the olfactory sensor being comprised of a polymer component.

1 48. A system for identifying a substance capable of producing  
2 olfactory information, the system comprising:  
3 a user interface apparatus comprising a display, a graphical user interface,  
4 and a central processor; and  
5 a process manager operably coupled to the display through the central  
6 processor, wherein the graphical user interface is capable of imputing an information  
7 object from a client to manipulate olfaction data and displaying the identity of the  
8 substance received from a server.

1 49. The system of claim 48, wherein the information object is selected  
2 from the group consisting of digital filtering, preprocessing, pattern recognition, mean  
3 centering, autoscaling and cross validation.

1                    50.    The system of claim 49, wherein pattern recognition is selected  
2    from the group consisting of PCA, FCA, KNN CV KNN Prd, SIMCA CV, SIMCA Prd,  
3    Canon Prd, and Fisher CV.

46